

Building the Racing Car Body

THE best practice in building racing car bodies indicates the use of steel throughout. Body steel is ordinarily about 20 gauge and is sold to the trade as automobile body steel. This is a particularly fine grade of steel and works very well.

Just as in the case of building the chassis, so in the case of the body, of the racing car to be. It is not a good plan for an author to attempt to specify exact dimensions for the simple reason that no two racing car chassis are ever just alike. On the other hand, general body lines are indicated in a number of the illustrations in this book. Some of the features which must be kept in mind when laying out the body are the width at the seat line, the height at the radiator, the height at the cowl and the position of the gas-line tank. These, together with the position of the steering gear, the position of the instrument board and the general streamlining desired actually determine the general shape of the body.

Perhaps the first dimension to determine is the width of the body. This must be considered when determining the width of the car frame, since, as a rule, the width of the body at the seat position is almost the identical width of the car frame. The body in fact usually is placed right on the car frame side members. If the body is to be designed in keeping with the requirements of the Contest Board of the A. A. A., then it will be not less than 31 inches wide.

If the car is to be a single seater, for use on some of the dirt tracks, then the width may be anything desired from a width just enough to take care of the driver who intends to pilot the car. This is not likely to be less than 17 inches or more than 23 or 24 inches.

RADIATOR AND COWL LINES. As in all motor car construction the radiator is one of the prime determining points of the body line. That is, it is not possible to get a good job unless there is a slight taper from the top of the radiator line upward, Fig. 128, to give proper streamlining. With this in mind it will be seen that one of the first things to do is to have the radiator in position and then begin laying out lines from this point. If the hood is to be made to fit the radiator, and this is usually the case, allow for some slight rise from the radiator top toward what will be the hood position when you have succeeded in establishing this. Note Fig. 137, page 47.

Perhaps the next point is to take into consideration the curvature of the front ends of the cowl, or what will be the rear of the hood. Naturally the position of the engine in the chassis is going to determine this.

The next point to determine is what will be the approximate position of the instrument board or what might be termed the rear of the cowling. Sometimes the cowl is laid on in one straight line and then in order to get the so-called scooped effect of the cowl, a separate piece of sheet metal is laid on. In other cases the body metal hammer is used and the cowl and the riser or sweep is hammered out. If the job is being built largely by hand the best plan no doubt is to keep the cowl straight, that is, no curvature from front to rear of the cowl and then depend on laying on another piece of metal to give the sweeping up effect to the cowl.

In laying out the body, it is best to work directly on the car frame and by means of erecting some temporary timbers or framing from light wood, it is possible to arrive at the approximate position and the approximate shape desired for the various parts of the body framework.

BODY FRAME OF STEEL. As suggested above, the best body construction entails the use of all steel. This means, aside from the covering of the body, the framework itself is of steel, assembled by riveting or by welding. If the builder has an opportunity to inspect racing car bodies, that would give him a great many ideas of how this work was done. Perhaps the best type of material to use for the frame and one which is most readily worked by the beginner, is to make use of a channel iron, say 1 inch wide and $\frac{1}{2}$ inch sides. The thickness ought to be about $\frac{3}{16}$ inch. Channel iron will bend more readily than will angle iron, although in some cases angle iron may be use for certain of the work. After having laid out the temporary pattern for the frame, it may be bent up in the proper curve from the channel iron and rigidly attached to the car frame. Anchor them in place and then proceed to brace them securely. After the sheet metal covering has been run on and riveted in place, the body will become quite rigid. These curved frame pieces should be set up at the rear of the hood, at the instrument panel partition, at the rear of the seat position and then at intervals toward the rear of the car, so as to give the curvature and streamlining desired.

FLOOR BOARDS. It is suggested that the floor boards be made of steel and naturally it is going to be necessary to determine the approximate position of the floor boards before the body details, such as the seat and other portions can be definitely determined. As a matter of fact, a considerable bit of layout work is necessary, since the building of the body for the racing car may be more or less of a tailoring of the body to fit the driver. The floor boards will have to clear the transmission much after the fashion of any passenger car. The pedals, of course, have to be brought through the floor boards as do all other controls which need to go through them.

All controls which come through the fire dash, which is erected from metal at the immediate rear of the motor block, must also be provided and estimated early in the construction of the body.

STEERING GEAR. The location of the steering gear on the car frame, usually mounting just ahead of the rear hood line and on top of the left-hand side member of the car frame, must be determined and the approximate angle of the steering gear must be determined before the body construction can proceed very far. The important feature with reference to the steering gear is to have it come down to a position where the top of the wheel will not be greatly above the top of the cowl and furthermore where it will be convenient to the grasp of the driver.

SEAT POSITION. The position of the seat is going to be determined very largely by the position of the floor boards and the position of the steering gear and wheel. Naturally the seat is to be lowered down as

far as possible. In some instances the seat is allowed to come below the top surface of the side members of the car. In fact, most of the low appearing effect of the racer is secured by means of placing the seat quite low so that the driver sits quite flat in the car. This may mean some rearrangement of the foot pedals and other controls. The best method to determine these items is to keep in mind the general requirements of the racing car body, that is, with reference to height and then work out the detailed dimensions in a most careful manner.

It is advised that the seat be laid on in a temporary form as well as other parts of the body and that the steering gear be located in a temporary position, in fact all of these items—the steering gear, the seat, the foot pedals, the instrument board, the cowling, the sweep of the cowling, the small windshield, if such is to be used, and all other features which are vital to the fit of the driver of the car—be worked out in temporary fashion and dimensions recorded so as to permit the permanent work to proceed without loss of time and without a lot of doing over. If the car fits the driver and all of the controls which are to be used and all of the instruments are right where he can see or touch as the need may be, then the actual controlling of the car at high speeds on the track is made very much safer. A car which places the driver in awkward positions in order to reach any of the controls or to manipulate the car is not a safe car. Such hazards can usually be avoided insofar as this is possible by giving thought to all of these vital units at the time the car body is being laid out. While there are car body builders who specialize in the building of racing car bodies, the usual requirements here is to have the chassis delivered to their shop so that they may proceed to build up the body to fit the chassis and in such case they consult with the one who is to drive the car in order that his particular requirements may be met.

Those cars which hold the world's records for straightaway performance have frequently been built around the driver. For instance, if he is a small man the amount of space must be allowed and the reach for the controls are taken into consideration and the car is actually tailored to fit the man. At high speeds the driver should become a part of the car, which is not possible if the controls are not nicely arranged for him.

REAR PART OF BODY. The rear section of the body, that is, from the rear of the seat backward, is designed to carry the gasoline tank. Ordinarily the cap is allowed to come just even with the upper section of this body. The actual streamlining of the rear most portion or tail of the body is the most difficult part of the body work. If the body is to be wide, that is, a 31 incher, then it is best to run in two frame members which will start at the approximate upper right and upper left-hand corners of the seat back and taper away to the tail end of the body, at which point they meet to conform to the general streamline effect desired. These two positions should be determined by means of experimentation with wood lath or similar material. Having determined them it is possible to continue with the body frame up work, as suggested above, wherein the curved upright and cross sections were mentioned. The idea of installing these two frame members which might be likened to corner strips, is in order to permit of building the rear part of the body in three sections. The novice or beginner is going to have much trouble in shaping up the sheet metal. Where

large presses are available for stamping out sheet metal parts it is possible to obtain very smooth flowing lines by means of these presses. This, of course, is out of the question with reference to racing car bodies and the job must really be hand tailored. By running in the corner members it will be possible to form up the three sections of the body and rivet them to the corner sections as well as the upright and cross over pieces, so that when the job is finished the edges on the corner strips may be covered by means of a mold and the entire job have quite a professional looking appearance. In order to make these rearmost panels conform to the desired streamlining it will be necessary to stretch the panels quite considerably. In some instances it will be necessary to shrink the edges and stretch the centers of the panels. Stretching of steel panels is ordinarily done under a sheet metal hammer. This hammer being nothing more than an oval-shaped hammer-like tool operated by power, over an anvil; the metal to be stretched being passed between the hammer and the anvil and as the stretching proceeds the panel will begin to take shape. Naturally this is a specialized job and anyone attempting to do it by hand must expect to use considerable time and be very patient in order to secure the same general effect. It can, of course, be done by using the metal between a hammer and an anvil and as the work proceeds a certain modicum of skill will be developed in forming up the metal parts.

The reader should make a very careful study of the general arrangement of the members of racing car bodies which appear within the illustrations in this book. By doing this he will be able to determine the approximate line of juncture of the different panels. For instance, usually there is a line of juncture in the lowest point of the sweep at the driver's seat position. This is a natural point of juncture. A frame member can be run in at that point and the edges of the sheet metal riveted together. In other illustrations it will be noted that a series of rivets appears just above the car frame line. These rivets are used to hold the body metal to the sill of the body. The sill of the body may be a piece of angle iron so as to permit the riveting of the side material to one leg of the angle and of placing the floor panels or floor boards on the other leg of the angle.

BUILDING A FABRIC BODY. There are those who will be interested in building up a body which resembles a racing car body and yet one which would not necessarily have to meet the requirements of the racing track. Such a body is very attractive for road use. The procedure is just about the same as indicated for the layout of the steel body. However, the wood posts and frame work may be used for all parts outside of the fire dash. Under no circumstances should wood be placed next to the engine nor should a chance be taken by running in wood or fabric close to the exhaust line. Note Fig. 137, page 47.

After having established all of the necessary lines and having erected the temporary layout posts, etc., then the workman may proceed to lay out and form up the permanent posts and braces. After these are set in position and bolted to the sills, which too may be wood, the entire structure having been framed up, the usual plan is to cover this structure with a covering of wire netting. Ordinarily the best material and the one most readily secured is a wire netting with $\frac{1}{2}$ inch square mesh and about a No. 16 gauge wire. This may be had in galvanized form.

Stretch this over the frame and form it out into curves or whatever general form is desired. It may be cut and trimmed and bent and worked in most any manner as long as a fairly general curvature or effect is secured.

After having covered the body with the wire netting, the next thing to do is to secure some cotton batting and lay this over the wire netting in one or two layers, so as to bring a nice even curvature and form to it.

Next secure a quantity of DuPont Fabricoid, an imitation leather, in whatever color it is desired and lay out the sections of the body and trim or cut them from the Fabricoid. It will be found that it is possible to stretch this fabric material to conform to curves very nicely. Make certain that the points at which the Fabricoid is to be tacked is one which will be in a proper line, which may later be covered by means of an aluminum or similar mold.

Proceed to stretch on the Fabricoid in sections and

tack it at the bottom of the body line and other portions where you intend to run on a mold. Having tacked on all of the Fabricoid, the final job in the body construction is running on the mold which breaks up the body covering into panels. If care is used in laying out this paneling, a very attractive job may be had.

The beauty of this type of construction is that it does not require any paint excepting in case the mold is to be painted. If aluminum mold is used it is possible to leave it in natural finish and polish with metal polish until it shines and it serves as a nice trim. This type of body work is pleasing to the eye, having a very soft or velvet-like appearance. It is actually soft to the touch and will stand up over a long period of years if cared for properly. It may be washed with ordinary soap and a scrub brush. A little wax will serve to keep it in condition. This type of body is not recommended for track use but simply for a sport car. It would not pass the rigid requirements of sanctioned racing events.

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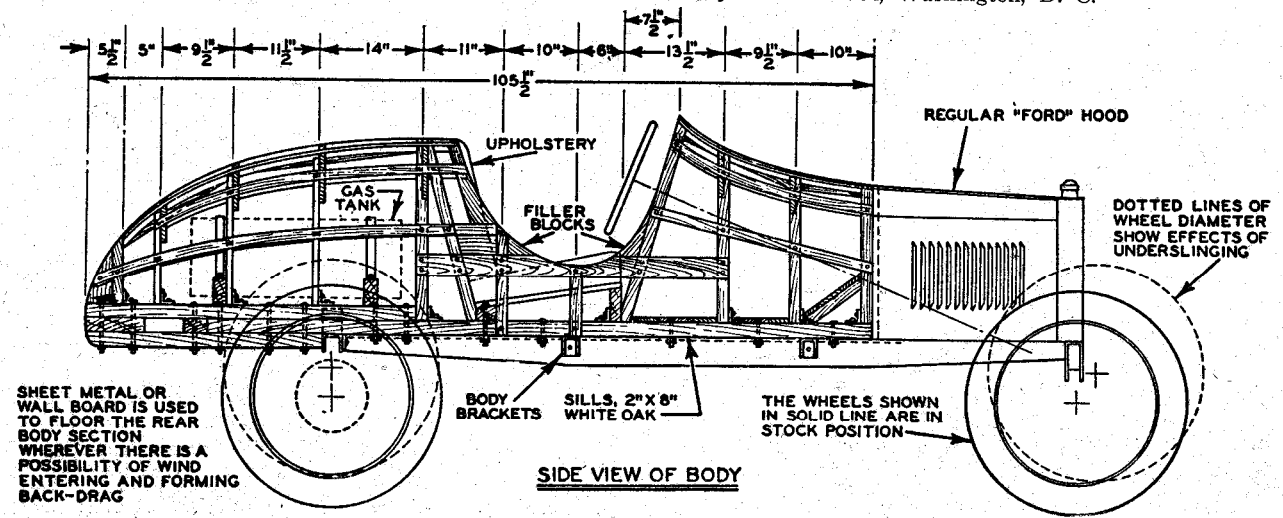


Fig. 137. This illustration shows the side view with dimensions for building a speedster body for a Model T Ford. It utilizes a wood frame covered with wire cloth, cotton wadding and Fabricoid. Complete plans for the body appear in February, 1931 issue of Modern Mechanics and Inventions Magazine published at Minneapolis, Minn. Complete plans in blue print form may be secured for one dollar to the publishers of Automobile Racing or to Modern Mechanics and Inventions. Racing car bodies are laid out in a similar manner but are all-steel construction.